

Solar Radiation Sensor pyrSi-03-D

Data Sheet and Modbus Specification

(Preliminary Version)

General Data:

Microprocessor-controlled Digital Signal Converter for Solar Radiation, Temperature and optional Wind Speed

- 12 bit Analog/Digital-converter for the Signal of the Solar Radiation
Measuring range: 0...1600 W/m², Resolution: 0.5 W/m²
- 9 bit Digital Temperature Probe
Measuring range: -25...+75°C, Resolution: 0.5 W/m²
- Optional: up to 3 external Digital Temperature Probes (e.g. for measurement of the ambient temperature and cell temperature of the PV-generator) can be connected parallel to the Temperature Probe of the sensor.
- Optional: one Wind Speed Sensor (Anemometer) with pulse signal can be connected
- Power supply: 12...30 V_{DC}, max. 30 mA
- Signal output: RS-485 with galvanic isolation to power supply
Protocol: Modbus-RTU
Each converter can be programmed with an individual address in order to built a network with several units
- Optional digital output: CAN-bus
- Optional analog signal output: 0...10 V_{DC} for the Solar Radiation and for the Temperature Signal

Modbus Specification:

Communication Settings:

Baudrates: 1200, 2400, 9600, 19200, 38400
Parity: no, even, odd
Stop bit: 1, 2 (at no parity)

Factory default: Modbus address: 1, 9600 baud, 8N1

Modbus Communication:

Transmission Mode: Modbus RTU

The CRC must be added to each packet and every response has a 2 byte Modbus-CRC

Supported function codes:

0x04 Read Input Register

- Register 0x0000: Irradiation measurement in 0.1W/m² (0..16000 for 0..1600,0 W/m²)
- Register 0x0001: Cell temperature measurement in 0.1°C (0..1000 for -25 to +75°C)
- Register 0x0002: Temperature compensated Irradiation measurement in 0.1W/m²
 (0..16000 for 0 .. 1600,0 W/m²)
- Register 0x0003: Cell voltage measurement in 0.01mV (0 .. 16000 for 0 .. 160,00 mV)

0x08: Diagnostics:

- Sub function 0x00: Return Query Data
- Sub function 0x01: Restart Communication
- Sub function 0x02: Force Listen Mode

0x46: Communication parameter:

The setting changes of sub function 04 to 06 will take effect after a restart command (function 0x08, sub function 01) or a power cycle.

Sub function 04: Write module address

Request packet: address | function code | sub function | new address

The device responses the same packet, if new address is OK.
 Otherwise it will return an error message

Sub function 05: Read communication parameter

Request packet: address | function code | sub function
 Response: address | function code | sub function | baud rate*1 | parity/stop bit*1

*1 see table below

Sub function 06: Write communication parameter

Request packet: address | function code | sub function | baud rate*1 | parity/stop bit*1
 Response: address | function code | sub function | baud rate*1 | parity/stop bit*1

*1 value from table:

baud rate	value
1200	0
2400	1
9600	2
19200	3
38400	4

parity / stop bit(s)	value
none / one	0
none / two	1
even / one	2
odd / one	3

Sub function 07: Read Hardware and Software Version

Request packet: address | function code | sub function
Response: address | function code | sub function | 2 byte HW | 2 byte SW

HW-Version: 2byte value 0 ... 65535
SW-Version: 2byte value 0 ... 65535

Sub function 08: Read Serial Number, manufacturing date and calibration date

Request packet: address | function code | sub function
Response: address | function code | sub function | 8 byte serial | 3 byte
manufacturing date | 3 byte calibration date

Serial Number: 8 byte value (MSB first) 0 ... 4294967295
Manufacturing date: 3 byte values:
1st byte day, 2nd byte month, 3rd byte year (last 2 digits)
Calibration date: 3 byte values:
1st byte day, 2nd byte month, 3rd byte year (last 2 digits)